CAUTIONS

CONCERNING THE

POISON

OF

LEAD *and of* COPPER;

WITH A

Method of Detecting theſe Metals in Wines,
Cyder, and various other Aliments.

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BRITISH MUSEUM

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CAUTIONS

TO THE

HEADS OF FAMILIES,

IN THREE ESSAYS:

I. On CYDER-WINE, prepared in Copper Veſſels; with Hints for the Improvement of Cyder, Perry, and other Fruit Liquors.

II. On the POISON of LEAD—Method of detecting it in various Liquors, Foods, Medicines, Coſmeticks, &c. with general Indications of Cure.

III. On the POISON of COPPER—How it may be diſcovered though in very minute Quantity—Method of Cure.

K

By A. FOTHERGILL, M.D. F.R.S.
Member of the Royal College of Phyſicians, London,
And of the Medical Societies of London, Edinburgh, and Paris.

Cur miramur tam brevem eſſe humanam vitam cum ſuapte vi noxia, etiam cura, nocentiora reddamus?

ADRIAN. TURN. DE VINO.

BATH, Printed by R. CRUTTWELL:
And ſold by C. DILLY, Poultry, LONDON; W. TAYLOR, BATH;
and all other Bookſellers in Town and Country.

M DCC XC.

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ENCOURAGEMENT OF AGRICULTURE, ARTS,
MANUFACTURES, AND COMMERCE;

THE FOLLOWING PAGES

ARE RESPECTFULLY INSCRIBED,

BY

THEIR MOST OBEDIENT

SERVANT AND COLLEAGUE,

THE AUTHOR.

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PREFACE.

THESE little Eſſays having been honoured with a place in the 5th Volume of the Bath Society's Papers, have lately been reviſed, and have alſo received ſome additions, not without hopes that the importance of the ſubjects on which they treat, may, in ſome meaſure apologize for their republication.

Larger works of this nature are rarely conſulted by thoſe who ſtand moſt in need of inſtruction. While ſome are too buſy, others are too indolent, to encounter a large volume; therefore without brevity there can be little utility.

Should this little Tract meet with a favourable reception from the Heads of Families, and tend to put them and their dependants on their guard againſt the evils it deſcribes, of which probably they never before had any idea, the well-meant cautions it contains, it is hoped, will not be wholly thrown away.

Theſe admonitions were chiefly deſigned for the uſe of the common people, who are moſt expoſed to the evils complained of, but are not, however, confined to any particular claſs, ſince every one is concerned in the preſervation of health: and if this be an object worth attending to, every one who deigns to peruſe them will, it is preſumed, feel himſelf in ſome degree intereſted therein.

Should the Fair-ſex condeſcend to glance over theſe pages, they alſo will perhaps find themſelves more concerned than they are at preſent aware of.

If the author has preſumed to hazard a few gentle ſtrictures on the abuſe of Coſmeticks, and even to ſtrip the toilet of a farrago of uſeleſs or pernicious articles, he hopes, nevertheleſs, that the Ladies will kindly forgive him. And, as he has not left them without offering to their conſideration a ſafe and approved ſubſtitute, fairly worth all the reſt, he humbly ſubmits it to their good ſenſe, whether it may not deſerve a fair and candid trial.

E S S A Y I.

Experiments and Obſervations on CYDER-WINE, *with Remarks on Fruit Liquors, and Hints for their Improvement.*

> Vinum tot veneficiis placere cogitur;
> Et miramur noxium eſſe.
>
> PLIN. lib. 14.

PURSUANT to the Society's requeſt, I have examined the cyder-wine prepared* after the method communicated by Dr. Ruſh, as practiſed in America, viz. by evaporating in a brewing *copper* the freſh apple-juice till half of it be conſumed. The remainder is then *immediately* conveyed into a wooden cooler, and afterwards is put into a proper caſk, with an addition of yeaſt, and fermented in the ordinary way. The proceſs is evidently borrowed from what has long been practiſed on the recent juice of the grape, under the term of *vin cuit*, or boiled wine, not only in Italy, but alſo in the iſlands of the Archipelago, from time immemorial.

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* By Mr. Stevens, a Gentleman of Ansford, Somerſet.

As it has lately become an object of imitation in the cyder countries, and particularly in the Weſt of England, where it is reported many hundred hogſheads of this wine have already been made; and as it is ſaid to betray no ſign of an impregnation of copper by the uſual chemical teſts, it is conſidered as perfectly wholeſome, and is accordingly drunk without apprehenſion by the common people; others, however, ſuſpect its innocence. It therefore becomes an object of no ſmall moment to determine in ſo doubtful a matter, whether the liquor acquires any noxious quality from the copper in which it is boiled, or not.

The wine ſent for my examination was of a red colour, ſomewhat turbid, and of a ſweetiſh empyreumatick taſte, reſembling that of a roaſted pippin —properties by no means deſirable in a vinous liquor, but which doubtleſs may be conſiderably meliorated by keeping to a proper age.

EXPERIMENTS.

Exp. I. VOLATILE ALCALI. Into a ſmall glaſs of cyder-wine were dropped 15 drops of volatile ſpirit of ſal ammoniack.—A ſlight precipitation enſued, the liquor became *darker* coloured, and on ſtanding, a thick cloud of a *greeniſh* caſt ſettled on the ſurface. The volatile alcali, whether *mild* or *cauſtick*, exhibited the *ſame* appearance.

Exp. 2. PHLOGISTICATED ALCALI. The like proportion of the phlogiſticated alcali gave a more viſible *green* tinge to the liquor, and on ſtanding produced a variegated *film* on the ſurface reflecting the priſmatick colours, ſimilar to what is obſerved in chalybeate waters expoſed to the air. At the *bottom* were ſome particles of a *brown* caſt.

Exp. 3. SOLUTION OF ORPIMENT. This liquor, which is prepared by chemiſts under the term of *Liquor vini probatorius*, or *wine teſt*, when dropped into the cyder-wine occaſioned a ſlight *cloudineſs*, followed by a precipitation of *browniſh* particles.

Exp. 4. A freſh portion of cyder-wine being diluted with three times its quantity of fair water, was afterwards tried with the above-mentioned liquors, and then exhibited the different phœnomena *more* diſtinctly.

Exp. 5. A bottle of my own cyder, ſent me from a friend in Devonſhire as *genuine*, was now ſubjected to the above chemical teſts, that the reſult might be compared. It however underwent no *material* change, except from the phlogiſticated alcali, which gave a faint greeniſh tinge, but *no* viſible *precipitation*.

Exp. 6. Polished Iron. A knife-blade, being immerſed a few hours in a glaſs of cyder-wine, when dried exhibited a *blackiſh brown* mark, interſperſed with ſhades of a *copper* colour. The wine at the ſame time aſſumed a darker hue, from a ſlight impregnation of the iron.

Exp. 7. Solution of Vitriol of Copper—being dropped on the poliſhed part of the blade, when dried gave a ſimilar mark, but of a *brighter* brown.

Exp. 8. Residuum. A pint of cyder-wine being evaporated in a tin veſſel to a thick extract, was next placed in a crucible, and, with an addition of tallow, was calcined to a black powder. This *reſiduum* was examined, and as no metallick particles appeared, a pint of ſpring water was poured upon it, and after it had ſtood all night to ſubſide, it was decanted into three ſeparate glaſſes.

Into the firſt was dropped ſome *volatile alcali;* into the ſecond *phlogiſticated alcali;* and into the third the *wine teſt*.

Slight marks of precipitation were barely perceptible in all the glaſſes, but the dark turbid appearance of the mixture concealed the changes of colour, as it did in ſome meaſure, in two of the preceding experiments, ſo as to render the reſult rather *equivocal*, though they were repeated more than once.

Being curious to know whether the ſame phœnomena would ſtrike other obſervers in a ſimilar way, I ſent a bottle of the cyder-wine to my ingenious friend Dr. *Johnſtone* of Worceſter, for his examination. His ſon ſoon after favoured me with the following letter, containing the reſult of his experiments, which I have the ſatisfaction to find agree very nearly with my own.

" SIR, *Worceſter*, *Sept.* 23.

" I am deſired by my father to acquaint you with the reſult of ſome experiments which I have made on the cyder-wine. By them it appears to be *conſiderably* impregnated with copper.

" I have the honour to be, Sir,

" Your obedient humble ſervant,

" JOHN JOHNSTONE."

EXPERIMENTS.

" 1. A ſteel pin put into the cyder-wine became of a *brown* colour, which left on the tongue the nauſeous aſtringent taſte of *copper*, at the ſame time the wine became of a darker colour, from ſome portion of iron diſſolved in it.

" 2. Sal volatile mixed with the cyder-wine made it of a *dark* turbid colour; it occaſioned in white-wine a kind of cloud ſimilar to that ſometimes obſerved in urine.

" 3. Phlogiſticated alkali precipitated a dark *brown* cloud very copiouſly; it had no effect on common white-wine; a clear proof of the preſence of *copper* in the cyder-wine.

" 4. A ſteel pin put into cyder-wine in which a precipitation had been made by ſal volatile, was *not at all* incruſted, nor was its colour in the leaſt changed, though it remained in the wine more than twelve hours."

Thus far my correſpondent.——

OBSERVATIONS.

Though a ſingle grain of copper diſſolved in upwards of twenty gallons of clear water may be detected by a viſible blue tinge appearing on the addition of a few drops of volatile alcali, yet this is by no means the caſe in turbid high-coloured liquors, which intercept the rays of light, and often occaſion a conſiderable *deception* in the appearances. Hence the neceſſity of diluting ſuch liquors in varying the experiments. In no inſtance did the blue tinge appear with the alcalies, even after the wine was diluted, and yet its abſence does *not* prove the liquor to be abſolutely *free* from an impregnation of copper. For I afterwards found that it required from three to five drops of a ſolution of vitriol of copper to give a viſible blue tinge to a glaſs of the liquor. The alcalies gave a greeniſh tinge to the wine; and copper, in form of verdegris, aſſumes indifferently a green or blue colour, according to circumſtances.

If the mark on poliſhed iron was darker than that which is produced by vitriol of copper, it was evidently owing to a ſmall portion of the *iron* diſſolved at the ſame time, and which always imparts a *blackiſh* tinge to poliſhed metals.

If the liquor was free from any metallick impregnation, why did it yield a *precipitation?*—a *variegated film?*—a *brown ſediment?* And why did it afford ſuch a ſtriking contraſt, when compared with genuine cyder, or white-wine?

When the metallick principle was precipitated by an alcali, the wine *no* longer gave the brown *coppery* tinge to the ſteel pin, and that for an obvious reaſon. Copper unites with an alcali rather than with iron.

On the whole, if we may rely on the above experiments, does not the general reſult afford a ſtrong preſumption, if not a proof, that the cyder-wine contains a minute impregnation of copper? Not ſo *conſiderable*, nor yet ſo very *palpable* (it is to be hoped) as my ingenious correſpondent ſeems to imagine, but yet ſufficient to put the publick on their guard concerning a liquor that comes in ſo very "*queſtionable a ſhape.*"

It is a curious chemical fact, if it be really true, that acid liquors, while kept *boiling* in copper veſſels, acquire little or *no* impregnation from the metal, but preſently begin to act upon it when left to ſtand in the *cold*. Can this be owing to the agitation occaſioned by boiling, or the expulſion of the aërial acid? Atmoſpherick air powerfully corrodes copper, probably through the intervention of the aërial, or rather nitrous acid, for both are now acknowledged to be preſent in the atmoſphere. But the latter is doubtleſs a much ſtronger menſtruum of copper than the former.

In the preſent proceſs, the liquor is properly directed to be paſſed into a *wooden cooler*, as ſoon as the boiling is completed. But as all acids, and even common water, acquire an impregnation, and unpleaſant taſte, from ſtanding in copper veſſels in the *cold*, why may not the acid juice of apples act in ſome degree on the copper *before* the boiling commences? Add to this, that brewing coppers, without far more care and attention than is generally beſtowed on them in keeping them clean, are extremely apt to contract verdegris, as appears from the blue or green ſtreaks very viſible when theſe veſſels are minutely examined. Should the unfermented juice be thought incapable of acting on the copper, either in a cold or boiling ſtate, yet no one will venture to deny its power of waſhing off, or diſſolving verdegris *already formed* on the internal ſurface of the veſſel. Suppoſe only one-eighth part of a grain of verdegris to be contained in a bottle of this wine, a quantity that may elude the ordinary teſts, (for reaſons already aſſigned) and that a bottle ſhould be drunk daily by a perſon without producing any violent ſymptom, or internal uneaſineſs, yet what perſon in his ſenſes would knowingly chuſe to hazard the experiment of determining how long he could continue even this quantity of a ſlow poiſon in his daily beverage, with impunity? And yet it is to be feared the experiment is but too often unthinkingly made, not only with cyder-wine, but alſo with many of the *foreign* wines prepared by a ſimilar proceſs. For the grape juice, when evaporated in a copper veſſel, under the denomination of *vino cotto*, or boiled wine, cannot but acquire an equal, if not yet ſtronger impregnation of the metal than the juice of apples, ſeeing that verdegris itſelf is manufactured merely by the application of the acid huſks of grapes to plates of copper.

Independent of the danger of any metallick impregnation, it may be juſtly queſtioned how far the proceſs of preparing boiled wines is neceſſary, or reconcileable to reaſon or œconomy.

The evaporation of the *muſt* by long boiling not only occaſions an unneceſſary waſte of both liquor and fuel, but alſo diſſipates certain *eſſential* principles, without which the liquor can never undergo a complete fermentation, and without a complete fermentation there can be no perfect wine. Hence the boiled wines are generally crude, heavy, and flat, liable to produce indigeſtion, flatulency, and diarrhœa. If the evaporation be performed *haſtily*, the liquor contracts a burnt empyreumatick taſte, as in the preſent inſtance; if *ſlowly*, the greater is the danger of a metallick impregnation. For the proceſs may be preſumed to be generally performed in a veſſel of braſs, or copper, as few families poſſeſs any other that is ſufficiently capacious. Nor can a veſſel of caſt-iron, though perfectly ſafe, be properly recommended for this purpoſe, as it would probably communicate a chalybeate taſte, and dark colour to the liquor. At all events braſs and copper veſſels ought to be entirely baniſhed from this, and every other culinary proceſs. The miſchievous conſequences reſulting from metallick poiſons, and particularly of lead and copper, are, I am convinced, more numerous and extenſive than is commonly imagined. The evil has long been loudly complained of, and yet the people of this country continue to ſacrifice their health and lives to the moſt unpardonable negligence and ſupineneſs, even when the remedy is at hand. But I ſhall reſerve my ſtrictures on this ſubject for a future paper.

Remarks on CYDER *and* PERRY.

Before I conclude, it may not be improper to add a few obſervations on the preſent ſtate of fruit liquors in our cyder counties, the improvement of which is an object of great importance to the publick, but particularly ſo to the inhabitants of thoſe diſtricts where theſe liquors conſtitute their common beverage. Cyder and perry, when genuine and in high perfection, are excellent vinous liquors, and are certainly far more wholeſome than many others which at preſent are in much higher eſtimation.

When the *muſt* is prepared from the choiceſt fruit, and undergoes the *exact* degree of vinous fermentation requiſite to its perfection, the acid and the ſweet are thus admirably blended with the aqueous, oily, and ſpirituous principles, and the whole imbued with the grateful flavour of the rinds, and the agreeable aromatick bitter of the kernels; it aſſumes a new character; grows lively, ſparkling, and exhilarating; and when compleatly mellowed by time, the liquor becomes at once highly delicious to the palate, and congenial to the conſtitution. Superior in every reſpect to moſt other Engliſh wines, and perhaps not inferior to many of the foreign wines.

Such I can venture to affirm would it be pronounced by all competent judges, were it not for the popular prejudice annexed to it as a cheap—home-brewed liquor, and conſequently within the reach of the vulgar. To compare ſuch a liquor with the foreign, fiery, ſophiſticated mixtures, often imported under the name of wines, would be to degrade it; for it certainly ſurpaſſes them in flavour and pleaſantneſs, as much as it excels them in wholeſomeneſs and cheapneſs. But rarely do we meet with perry or cyder of this ſuperior quality. For what is generally ſold by dealers and innkeepers is a poor, meagre, vapid liquor, prone to the acetous fermentation, and of courſe very injurious to the conſtitution. Is it not very mortifying, after the experience of ſo many centuries, that the art of preparing theſe ancient Britiſh liquors ſhould ſtill be ſo *imperfectly* underſtood as yet to ſeem to be in its very infancy?—That throughout the principal cyder diſtricts, the practice ſhould ſtill reſt on the moſt vague, indeterminate principles; and that the excellence of the liquor ſhould depend rather on a lucky *random* hit, than on good management! Yet ſuch appears to be really the caſe even among the moſt experienced cyder-makers of Herefordſhire and Glouceſterſhire!

Mr. Marſhall, that nice obſerver of rural affairs, in his late Tour through thoſe counties (expreſsly undertaken for the purpoſe of inquiry on this ſubject) informs us, that ſcarcely two of theſe profeſſional artiſts are agreed as to the management of ſome of the moſt eſſential parts of the proceſs.* That palpable errors are committed as to the time and manner of gathering the fruit—in laying it up—in neglecting to ſeparate the unſound—and to grind properly the rinds, and kernels, &c. That the method of conducting the vinous fermentation, the moſt *critical* part of the operation, and which ſtamps the future value of the liquor, is by no means aſcertained. While ſome promote the fermentation in a ſpacious open vat, others repreſs it by incloſing the liquor in a hogſhead, or ſtrive to prevent it altogether. That no determinate point of temperature is regarded, and that the uſe of the thermometer is unknown, or neglected. That they are as little conſiſtent as to the time of racking off, and whether this ought to be done only once, or five or ſix times repeated. And that for fining down the liquor, many have recourſe to that odious article, bullock's blood, when the intention might be much better anſwered by whites of eggs, or iſinglaſs. And finally, that the capricious taſte of particular cuſtomers is generally conſulted, rather than the real excellence of the fruit wine, and conſequently that a very imperfect liquor is often vended, which tends to reduce the price, to diſgrace the vender, and to bring the uſe of cyder and perry into diſrepute.

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* Marſhall's Rural Oeconomy of Glouceſterſhire, ii. 308 & ſeq.

The art of making vinous liquors is a curious chemical proceſs, and its ſucceſs chiefly depends on a *dexterous* management of the vinous fermentation, beſides a cloſe attention to ſundry minute circumſtances, the theory of which is perhaps not yet fully underſtood by the ableſt chemiſts. Can we longer wonder then that ſo many errors ſhould be committed by illiterate cyder-makers, totally unverſed in the firſt principles of the chemical art? Some few indeed, more enlightened than their brethren, and leſs bigotted to their own opinions, by dint of obſervation, ſtrike out improvements, and produce, every now and then, a liquor of ſuperior quality, though perhaps far ſhort of excellence; yet ſtill ſufficient to ſhew what might poſſibly be accompliſhed by a ſeries of new experiments conducted on philoſophical principles.

This might lead to ſucceſſive improvements, till at length our Engliſh fruit liquors might be carried to a pitch of perfection hitherto unknown, by which the demand, both at home and abroad, would ſoon be enlarged, the prices augmented according to the quality, the value of eſtates increaſed, and the health and proſperity of theſe counties proportionably advanced.

This might alſo help to point out a method of correcting the imperfections of theſe liquors; and of meliorating thoſe of a weak, meagre quality, by ſafer and more effectual means than are now practiſed: and though nothing can fully compenſate the defect of ſun-ſhine in maturing the ſaccharine juices, in unfavourable ſeaſons, yet probably ſuch liquor might, without the dangerous and expenſive method of boiling in a copper veſſel, admit of conſiderable improvement by the addition of barm or other ſuitable ferment, as yet unknown in the practice of the cyder diſtricts; or perhaps rather by a portion of rich *muſt*, or ſome wholeſome ſweet, as honey, ſugar-candy, or even melaſſes, added in due proportion, previous to the fermentation.*

Now, ſhould this Society intereſt themſelves in the preſent inquiry, in which this and the adjacent counties are materially concerned, might it not be adviſeable to offer a ſuitable premium to ſtimulate the cyder-makers to undertake ſuch a courſe of experiments as may ſeem proper towards the improvement of perry and cyder, and alſo for correcting, or meliorating theſe liquors when prepared from an unripe or inferior fruit?

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* Since the above was written, I learn from a recent publication, that the Germans are known to meliorate their thin harſh wines by an addition of concentrated Muſt, not by evaporation, but by *freezing*. By this ſimple proceſs they are made to emulate good French wines;— a practice worthy imitation, eſpecially in the Northern climates.

See HOPSON's Chemiſtry.

It is greatly to be regretted that the capital old fruits, which raiſed the fame of the liquors of this country, are now chiefly loſt, or ſo far on the decline as to be deemed irrecoverable.

Mr. Marſhall, in his late ſurvey of the orchards in Herefordſhire, aſſures us that the *redſtreak* is given up: The celebrated *ſtire* apple is going off; and the *ſquaſh* pear, which has probably furniſhed this country with more CHAMPAIGN than was ever imported into it, can no longer be got to flouriſh; the ſtocks canker, and decay.

In Yorkſhire ſeveral fine old fruits, which were productive within his own recollection, are loſt: the ſtocks cankered, and the trees barren.

The famous *Hagloe* crab, which yields a cyder that for richneſs, flavour, and price on the ſpot, ſurpaſſes perhaps every other fruit liquor, having been valued at ſixty guineas the hogſhead, is confined to a ſmall diſtrict near Roſs in Herefordſhire,* and will probably in a few years be extinct. Is it not ſurprizing that the cultivation of ſuch excellent varieties of fruit-trees ſhould be thus limited to a few particular counties, and ſo much neglected even in theſe; when probably by due attention to ſoil, aſpect, and other leading circumſtances, they might be ſucceſsfully raiſed, and propagated in almoſt any quarter of the kingdom?

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* Rural Oeconomy of Glóceſterſhire, Herefordſhire, &c. Vol. II. page 253.

That fruit liquors, when of a good quality, and drunk with moderation, afford an uncommonly wholeſome and cheap beverage, is allowed on all hands, and confirmed by long experience.

Nor can any arguments againſt its utility be fairly drawn from its abuſe, or from the evils that neceſſarily enſue from the enormous quantities of bad cyder conſumed by day-labourers.

In the Vale of Gloceſter, ſays *Mr. Marſhall,* ſix quarts a day is the common allowance; ſometimes nine or ten quarts; or an unlimited quantity! In a plentiful fruit-year cyder is of very little value: men and maſters are equally adepts in the art of drinking; and the tales that are told of them appear ſo incredible, it is to be hoped they are not ſtrictly true. Drinking a gallon-bottle-full at a draught, is ſaid (on good authority) to be no uncommon

common feat:—a mere wanton trick that will not bear to be bragged of. But to drain a two-gallon bottle without taking it from the lips, as did a certain labourer, is ſpoken of as an exploit worthy an inhabitant of the Vale of Glocester! Another man of the Vale, however, undertook for a trifling wager to drink twenty pints of cyder, one immediately after another. He got down nineteen, (as the ſtory is gravely told) but theſe filling the caſk to the bung, the twentieth could not of courſe get admittance: ſo that a Severn-man's ſtomach holds exactly two gallons three pints! But the quantity drunk in this extemporaneous way by the men is trifling compared with that which their maſters will ſwallow at a ſitting. Four well-ſeaſoned yeomen (well known in the Vale) having raiſed their courage with the nectarious juice of the apple, reſolved to have a freſh hogſhead tapped; then ſetting foot to foot, they entirely emptied it at one ſitting!*

Concerning the effects of ſuch extravagant feats performed by thoſe mad topers, our author is ſilent; but if ſimilar debauches are frequently committed with impunity (which ſeems ſcarcely credible) they afford a ſtriking example of the ſalubrity of cyder, perhaps not to be paralleled by any other vinous or fermented liquor. At all events ſuch wanton exceſſes ought by every poſſible means to be diſcouraged. But to the diſgrace of our police, the law which inflicts penalties on drunkenneſs, inſtead of being ſtrictly executed, is generally ſuffered to remain a dead letter. Meanwhile, I fear it will be in vain to admoniſh theſe thorough-paced ſoakers—or attempt to deter thoſe brutes in human ſhape from purſuing the high road to ruin! In vain ſhall we ſtrive to convince them that a habit of drinking, learnt in youth, is not eaſily abandoned in riper years, and that a continued abuſe of even the moſt innocent fermented liquor, will, in the long run, infallibly prove a ſlow, but fatal poiſon!

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* Oeconomy of Glouceſterſhire, vol. i. p. 53.

ESSAY II.

On the POISON of LEAD;

With Cautions to the Heads of Families concerning the various unſuſpected Means by which that inſidious Enemy may find Admiſſion into the Human Body.

Hinc dira tormina!—Hinc genæ pendulæ, tremulæque manus!

Plin.

TO call forth latent abilities, and to promote a generous emulation amongſt our huſbandmen, manufacturers, and artizans, is the profeſſed object of the Bath Society. But while we thus endeavour to enlighten the minds, and to kindle the zeal of the common people, ought we not to inſtruct them moreover in the neceſſary means of preſerving their health? Without this, how ſhall we enable them to encounter with alacrity their laborious purſuits? Without health the daily taſk cannot be performed. The plough and the team lie uſeleſs—the buſy loom becomes ſilent—and all the œconomical arts languiſh! Till confined to the bed of ſickneſs, this uſeful claſs of people are of all others the moſt inattentive to their health. It is not till then that they begin to be truly ſenſible of its value, and then with heartfelt ſighs they deplore its abſence! Each rural ſcene that lately delighted the ſenſes, has on a ſudden loſt all its charms, and the gay face of nature is now beheld with an eye of indifference, or even diſguſt.

> For what are fields, or flow'rs, or ſtreams to me,
> Ah! taſteleſs all, if not enjoy'd with THEE,
> O HEALTH!————

It is always much eaſier to prevent diſeaſes than to cure them. Therefore to impreſs the common people with a due ſenſe of the importance of their health, and to put them on their guard againſt one of the moſt frequent, though unſuſpected cauſes of many of their chronick diſeaſes, is the buſineſs of this eſſay.

The miſchiefs ariſing from culinary poiſons preſent a wide field for diſcuſſion; but I ſhall confine myſelf at this time, to *the poiſon of Lead.* Is it not a moving ſpectacle to ſee poor induſtrious tradeſmen, particularly the manufactureres of red and white lead, daily expoſed to the noxious fumes of this pernicious metal? Unhappy men, whoſe hard lot it is to earn, by the ſweat of their brow, a ſcanty maintenance, breathing all the while a tainted air, and inhaling a ſlow poiſon at every pore, in order to prolong a wretched exiſtence! Theſe ſurely have a peculiar claim to our compaſſionate regards, and I ſhould think myſelf happy if I could awaken the attention of this Society towards the alleviation of their ſufferings.

The London Society have not been inattentive to this great object, as appears from their late premiums, particularly concerning a ſubſtitute for white lead, or a method of diveſting it of its deleterious quality;—an object highly worthy your conſideration, as this noxious ſubſtance conſtitutes the baſis of all our common paint, the injurious effects of which are univerſally complained of.

The extenſive uſe of lead in various forms, enables it to aſſail all the avenues of life.——Sometimes it attacks the human frame by an open aſſault, but more frequently it makes inroads into the conſtitution as a ſecret unſuſpected enemy. Various cauſes conſpire to favour its introduction into the ſyſtem. The arts of chemiſtry, of medicine, and even of cookery, have all ſucceſſively lent their aid; inſomuch that no perſon of whatever rank or ſtation, from the prince to the peaſant, can, at all times, pronounce himſelf perfectly ſecure againſt its ſilent depredations.

Devoutly therefore, not ludicrouſly, may we now exclaim with Sir John Falſtaff,

"Heavens, keep lead out of us!"

The jovial knight, like a *bon-vivant* of the preſent day, not dreaming of its admiſſion into his body by any mode but one, viz. that of a leaden-ball, continued to quaff his ſack in ſeeming ſecurity, while each draught probably contained a portion of the deteſted metal which he ſo piouſly deprecated. For our anceſtors in thoſe days were no novices in the myſtery of refining liquors with lead, though by no means ſuch able adepts as their ſucceſſors, who (to do them juſtice) appear to have carried the art to its *ne plus ultra*.

But to be ſerious:—Though the above apprehenſions to ſome may ſeem imaginary, or at leaſt exaggerated, yet whoever attentively conſiders the well-authenticated facts adduced by Sir George Baker, Dr. Percival, and other eminent authors, concerning this poiſon, will ſoon be convinced that they are but too well founded, and conſequently that theſe cautions are not altogether ſuperfluous. Seldom do the common people err through exceſs of caution, but often through the want of it. Few of them indeed have leiſure or inclination to trace this ſubject through a variety of medical volumes, who nevertheleſs peruſe, with eagerneſs, the Society's papers, or other ſhort eſſays in which they conſider themſelves to be materially intereſted. The following admonitions, therefore, are not addreſſed to the medical faculty, but to the heads of families, whoſe duty it is to watch over the health of thoſe who are committed to their charge.

GENERAL EFFECTS OF THE POISON OF LEAD.

Lead in every form is unfriendly to animal and vegetable life. The miners who dig the ore, the ſmelters who reduce it to a metallick ſtate, manufacturers of white lead, painters, plumbers, in a word, all who are much expoſed to its effluvia, bear teſtimony to its pernicious effects. Its fumes are found no leſs deſtructive to domeſtick animals, ſuch as dogs, cats, fowls, &c. nay, even vegetables in its neighbourhood ſoon loſe their verdure; nor can plants thrive in pots compoſed of this metal. Its various preparations, as litharge, red and white lead, are all poiſonous, and their activity is increaſed by their union with acids. Lead unfortunately being thus liable to be corroded, or even diſſolved by almoſt every ſpecies of acid, the dangerous conſequences are proportionably increaſed. For it not only unites with the ſtronger mineral acids, but alſo with thoſe of the weaker vegetable kind, as that of wine, beer, cyder, vinegar, verjuice, &c. to which it imparts a manifeſt ſweetneſs, forming a ſalt termed ſugar of lead. Hence the foundation of that moſt dangerous abuſe of correcting acid wines and cyder with litharge, or other preparations of this metal. Lead alſo unites with expreſſed oils, and other unctuous bodies, as butter, ſuet, lard, &c.

Hence in Holland it has been cuſtomary to correct the more offenſive expreſſed oils, ſo as to ſubſtitute them for oil of olives, or almonds, by impregnating them with lead.—Another horrible abuſe, and which merits the moſt exemplary puniſhment! Deliberately thus to adulterate the common articles of life with a ſlow poiſon, and wantonly to ſacrifice the lives of innocent perſons to unfeeling avarice, ſeems a refinement in villainy at which human nature revolts, and which could hardly be credited in a Chriſtian country! The ſavage tribes of the moſt barbarous nations, who attack their declared enemies with poiſoned arrows, are never known to diſcharge them at their unoffending neighbours and countrymen.

To ſuch an alarming pitch had the dangerous art of adulterating liquors with lead arrived in France, that at length it became neceſſary to make it a capital offence. I am unwilling to believe that any man would preſume to practiſe this inhuman fraud, were he fully apprized of the poiſonous nature of the ingredient. That none of my readers may plead ignorance, I ſhall briefly mention its principal effects.

This metallick poiſon then is powerfully ſtyptick, and highly injurious to the nerves, hence it ſuppreſſes the natural inteſtinal diſcharges, producing obſtinate coſtiveneſs, and a peculiar ſpecies of colick terminating in palſy of the extremities, which generally deprives them of motion, without deſtroying their ſenſation. Theſe ſymptoms, being the genuine effects of lead, ſeem to mark its ſpecifick power, and to diſtinguiſh it from every other poiſon.

It moreover occaſions a pale ſallow countenance, contraction and waſting of the muſcles, numbneſs, tremors, languors, convulſions, epilepſy, and death. —Theſe ſymptoms vary according to the quantity of the poiſon, the ſtate of the body, the irritability of the ſyſtem, and other circumſtances. Sometimes, without producing ſpaſms or other violent ſymptoms, it only occaſions a ſlow lingering indiſpoſition, which, however, laſts ſome years, and at length generally eludes the power of medicine. This well accords with what has been tranſmitted to us concerning the ſlow poiſons of the ancients, and ſeems to confirm the ſuſpicion that their baſis was no other than a ſecret calx of lead.—May this fatal calx long reſt in oblivion, and never more be revived!

Various ways in which it is admitted into the Body.

This poiſon may be received into the body in diet, and in medicine.

1. *Diet.*—WATER, which conſtitutes ſo large a proportion of diet in every nation, is generally conveyed through leaden pipes, or cylinders of pumps, and is often left to ſtand in leaden ciſterns. As theſe have ſometimes been found corroded in certain places, by *Newmann* and other chemical writers, it has been ſuſpected, and not without reaſon, that the water might thus receive a ſlight impregnation from the metal.—*Galen* and *Vitruvius* loudly condemn leaden pipes for the purpoſe of conveying water, becauſe their internal ſurface contracts a covering of white lead. *Dr. Heberden* kept water in which lead had been immerſed twelve

years: the water exhibited a whitiſh powder at the bottom, and gave a brown tinge to a ſolution of orpiment, and volatile tincture of ſulphur—proofs of the preſence of lead. *Sir George Baker*, however, repeated the experiment by keeping water in a leaden tube, but at the end of two months the water diſcovered no ſenſible impregnation by the above teſts. He relates however, on the teſtimony of *Dr. Wall*, that a family in Worceſter ſuffered a long tedious indiſpoſition, with ſome ſymptoms of this poiſon, in conſequence of daily uſing a hard aluminous water. On examining the pump, the leaden cylinder was found corroded, and even perforated by the water, although it had been repaired only three years before. On removing to another houſe ſupplied with better water, the family at length recovered their wonted health. From theſe facts it would appear that water, under certain circumſtances, is capable of corroding lead, ſo as to prove injurious to health. Some authors affirm, others poſitively deny this concluſion. Pure water, it is true, is no menſtruum for lead, but rarely do we meet with water that is pure. Pump or ſpring water is generally impregnated with a ſmall portion of vitriolick or marine ſalt, but lead is hardly capable of detaching theſe acids from an alkaline or earthy baſis, and therefore cannot communicate any poiſonous quality to the water: hence this metal,

though

though immerſed in a ſolution of alum, remains unchanged. Nor can the aërial acid enable water to act upon lead. But ſhould the water contain any mineral or vegetable acid, uncombined with earth, a circumſtance which rarely occurs, it may then, though in a very dilute ſtate, corrode the metal ſufficiently to produce miſchievous effects. This ſeems actually to have been the caſe at Worceſter. For it certainly muſt have been an acid, not alum, that corroded the lead.——This may ſuggeſt to us the following cautions:

1ſt. That whenever water betrays any ſenſible mark of acidity, by an aluminous taſte, or by changing ſyrup of violets red, ſuch water, if meant for internal uſe, ought never to come in contact with lead.

2d. Water conveyed from the leaden gutters of houſes, or ſtanding long in leaden ciſterns expoſed to falling leaves, from which it may acquire an acid quality, is alike exceptionable. To this cauſe, *M. Tronchin* attributed the epidemick colick which ſome years ago prevailed at Amſterdam.

Wines.—It is worthy obſervation, that the endemial colick, which formerly was wont to infeſt the inhabitants of Poitou, ſo as to become proverbial, is now no longer known, ſince the practice of adulterating wines has been aboliſhed from that diſtrict. In whatever country the liquors are impregnated with lead, either by accident or deſign, this diſeaſe will be found to prevail, as will, I think, more fully appear in the ſequel. Hence the colick of Poitou, and of Devonſhire, and the dry belly-ache of the Weſt-Indies, (whatever ſome may aſſert to the contrary) are evidently one and the ſame diſeaſe, and may clearly be traced to the ſame cauſe, namely, the poiſon of lead.

Notwithſtanding the ſeverity of the laws, the fatal abuſe ſtill prevails, particularly in many parts of France and Germany, where their weaker wines, being prone to acidity, are ſtill, in defiance of all laws, human and divine, corrected with litharge, or ſweetened with ſugar of lead! Nor is this wholly confined to the lower white-wines, ſuch as the Rheniſh, and the Moſelle, for in a late French publication, intitled LA MAISON RUSTIQUE, a large ball of lead is piouſly directed to be ſuſpended in the caſk in order to prevent the wines of *Burgundy* from turning acid! At Paris, the low meagre wines commonly ſold to the populace are made to run through a leaden channel, and are diſtributed to the cuſtomers in meaſures compoſed of tin, or baſe pewter containing a large portion of lead. Accordingly the colick of Poitou is ſtill predominant in Paris. *Dr. Gadane* computes the average number of inhabitants annually afflicted with this diſeaſe to amount to five or ſix hundred. *M. Senac*, late phyſician to the King of France, adds his teſtimony concerning the frequency of the diſeaſe at Verſailles. *Dr. Warren* enumerates thirty inſtances among the ſervants and domeſticks of an Engliſh nobleman, during his reſidence at Hanover, all occaſioned by the ſame cauſe. It has been obſerved with ſurprize that, at Surinam, the Europeans who drink French wines are extremely liable to this diſeaſe, while the natives, who refrain from this beverage, entirely eſcape.

If we turn our attention to our Engliſh *made* wines, I fear they will by no means be found clear of ſuſpicion. In Graham's art of making Britiſh wines, are the following choice receipts:

1. *To ſoften Green Wine.*

Put in ſome vinegar wherein *litharge* has been well ſteeped, and put a quart of it into a tierce, and this will mend it, in ſummer eſpecially.

2. *To hinder Wine from turning ſour.*

Put a pound of melted lead in fair water into your caſk pretty warm, and ſtop it cloſe.

From which it appears that William Graham was deep in the myſtery of vintners: and his book, having gone through no leſs than ſix editions, may be reaſonably ſuppoſed to have revealed the dangerous ſecret of thoſe adepts in iniquity, to at leaſt three thouſand innocent families, together with their friends and connections! But to eſtimate the ſum total of miſchief accruing from the numerous receipt-books of this ſtamp publiſhed within theſe fifty years paſt, "highly neceſſary (as the editors gravely obſerve) to ALL FAMILIES," entirely baffles calculation! For, according to the ſage advice of thoſe worthy authors, ſcarcely any family is now found without one or more of their "faithful guardians of health, or truſty monitors in every thing relating to food or phyſick!"

To ſupply the publick with an effectual antidote to the various poiſons conveyed in theſe books, and diſſeminated far and wide among the people, would be worthy the pen of the ableſt chemiſt, and every life thus reſcued from their pernicious effects would well intitle him to a civick crown.

RUM.—The dry belly-ache, or, in other words, the colick of Poitou, is a prevailing diſeaſe in the Weſt-Indies, particularly among thoſe who drink rum. Some attribute it to the newneſs of the ſpirit, others to the acid juice of the limes which generally accompanies its uſe. But the former, when genuine, is inadequate to the effect; the latter, inſtead of producing the diſeaſe, is found rather to be a remedy.

Dr. John Hunter, in the year 1781, being ſtationed with the army at Spaniſh-town in Jamaica, finding this diſeaſe very prevalent among the ſoldiers who drank *new* rum, while others who abſtained from it remained free, began to examine cloſely the liquor, and alſo the implements uſed in the diſtillery. The rum, in his experiments, gave evident ſigns of an impregnation of lead. The worm of the ſtill, conſiſting of a large proportion of lead, he found corroded. An acid reſiduum called *dunder*, it ſeems, is added to the mixture before diſtillation, and partly riſes with the ſpirit. No wonder then that the lead was corroded by it. The ſpirit, in proceſs of time, in a great meaſure depoſits the lead, hence old rum is found much leſs unwholeſome than new. If rum be left to evaporate in a glaſs, it leaves an acid remnant behind. He further adds, that if a piece of lead be immerſed in *pure* proof ſpirit the ſpace of ten weeks, the liquor is found to have acquired a ſlight impregnation from the metal—A new and ſingular circumſtance; but which I believe never can take place where *pure* ſpirit is employed.

The nitrous acid is ſometimes clandeſtinely uſed to correct ill-flavoured rum, and ſuch an adulterated ſpirit may be readily conceived capable of acting on lead, though *pure* ſpirit certainly cannot. Hence it is eaſy to ſee how the above deception in the Doctor's experiment might tend to miſlead his judgement. Diſtilleries, and even breweries, with all their apparatus, ought to undergo a narrow inſpection, as acids, and even their effluvia, are capable of corroding lead. Therefore the leaden worms, ſpouts, gutters, in a word, every utenſil containing that metal, ought to be viewed with a jealous eye. Nor ought the enquiry to be confined to theſe places alone: for if we extend our views to our wine and cyder-preſſes, dairies, kitchens, and ſtore-rooms, we ſhall probably meet with much to be complained of—much to be reformed. Whether the apothecary's ſhop, or even the elaboratory of the chemiſt, will bear a very cloſe ſcrutiny, may perhaps be juſtly doubted. For be it remembered, that not only lead and pewter, but alſo the tinning of copper veſſels, the ſolder containing a mixture of lead, and the glazing of earthen ware being a calx of lead, are all liable to be corroded by acids, or even expreſſed oils.

CYDER.—That acid wines or crude cyder may, independent of any adulteration, produce bowel complaints, attended with griping pains, and diarrhea, cannot be denied, but that they ſhould occaſion a colick, complicated with coſtiveneſs, and terminating in palſy, is highly improbable. On the contrary, that this diſeaſe is the genuine produce of the poiſon of lead ſeems to have been proved by the moſt ſatisfactory evidence. The endemial colick of Devonſhire, aſcribed by *Dr. Huxham* and others to the acidity of new cyder, has at length been clearly traced to the above poiſon.

From the elaborate eſſays of *Sir George Baker* on this ſubject, it appears, that " in thoſe diſtricts where the diſeaſe was moſt prevalent, lead was generally found in the preſſes or utenſils employed in making the cyder, and that on analyſing the ſuſpected liquor, he obtained from it a ſmall portion of *real* lead.* That ſome of the farmers had been known to buy ſugar of lead to correct the acidity of their cyder! That others, in order to preſerve their weak cyder for the uſe of their labourers, were wont to have recourſe to the well-known ſecret of ſuſpending a leaden ball in the caſk. That the cyder is generally drawn into large *glazed* pitchers, in which it often ſtands many hours before it is drunk by the labourers. And finally, that according to the teſtimony of the late *Dr. Charlton*, moſt of the paralyticks recommended to the Bath Hoſpital were ſent from the cyder counties, except Herefordſhire, where, on enquiry, it was afterwards diſcovered that lead was not employed in any part of the cyder apparatus of that county."

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* This, I am not ignorant, has been ludicrouſly attributed, by ſome of his Devonſhire antagoniſts, to leaden ſhot accidentally left in the bottles before the cyder was bottled: By others, to a portion of lead introduced by deſign, in order to raiſe a laugh at the Doctor's expence. But admitting ſo accurate an obſerver could ſo eaſily be impoſed upon, (which is highly improbable) yet the doctrine reſts not on this experiment alone, but on a ſeries of facts which ſtill remain unſhaken; and which, perhaps, will not be found eaſy to overturn.——For the circumſtances have been communicated by different authors at different periods, and without the ſlighteſt appearance of colluſion, and yet all tend to the ſame point.

Since the above was written, however, I am ſorry to find, from *Mr. Marſhall's* late ſurvey of the Cyder-proceſs in Herefordſhire, that lead is not *wholly* diſcarded, but a portion of the old leaven is yet ſuffered to remain. "The bed or floor of the "preſs, ſays he, which is now generally compoſed "of wood or ſtone, formerly was uſually covered "with lead, which by being diſſolved in the *acid* "of the liquor, has probably been the cauſe of "much miſchief. Nevertheleſs lead is ſtill ſuffered "to remain about ſome cyder-preſſes. There is a "publick mill at Newnham, whoſe bed is *entirely* "covered with lead; and I have ſeen others whoſe

" lips, or ſpouts, and a rim round the outer edge,
" are of that dangerous metal!" †

A ſtriking inſtance of ignorance, obſtinacy, and impolicy! otherwiſe a practice ſo injurious to health, and detrimental to the credit of the liquor, would not be thus abſurdly perſiſted in. I know it is pretended that the quick paſſage of the apple-juice through ſuch ſpouts or gutters does not afford time for any impregnation. But this is a miſtake, for the leaden ſurface being often wetted, and alternately dried by expoſure to the air, contracts minute particles of ceruſs, or ruſt of lead, ready to be waſhed off, and diſſolved in the courſe of the proceſs. Sometimes the juice is even ſuffered to ferment in veſſels lined with lead, which ſtill greatly increaſes the danger. An inſtance of this kind lately occurred at Frome:—A family of three perſons drank freely of this liquor, and were at length ſeized with the colick of Poitou. The maſter who drank the greateſt quantity, ſuffered moſt, and his diſeaſe terminated in a fatal palſy;—the wiſe and maid-ſervant, who drank leſs, underwent ſimilar ſymptoms, but eſcaped with life.

It is high time that this, and the ſtill more unpardonable abuſe of wilfully adulterating cyder with lead, ſhould be wholly ſuppreſſed;—that an enquiry ſhould be ſet on foot through all the cyder diſtricts, that ſuch practices may be detected wherever they exiſt; and that the colick of Poitou may no longer be emphatically ſtiled the colick of Devon.

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† Rural Oeconomy of Glouceſterſhire, Herefordſhire, &c. p. 313.

Milk *and* Cream.—The veſſels of our modern dairies conſiſt chiefly of lead, or earthen-ware glazed with a calx of that metal, both which are liable to be corroded by weak acids, and oily ſubſtances. Whether the milk and cream are ſuffered to remain in them long enough to acquire an impregnation of the metal has not been determined: but the acid odour which ſtrikes the noſtrils on entering certain dairies, eſpecially in a warm ſeaſon, is at leaſt ſufficient to excite ſuſpicion, and to put the publick on their guard till the ſafety of theſe veſſels be more fully aſcertained. My late ingenious friend *Mr. Hayes* has already offered ſome judicious ſtrictures on the abuſe of theſe veſſels in dairies, and mentioned others as proper to be introduced in their place.*

But if veſſels of caſt-iron, which he propoſed to ſubſtitute for leaden ones, ſhould be found to impart an unpleaſant colour or chalybeate taſte to the milk (as we have reaſon to apprehend) it will prove an inſuperable objection to their uſe. After all; the wiſeſt ſtep would be to return to the ancient wooden bowls of our anceſtors, than which nothing can be more perfectly ſafe or free from ſuſpicion.

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* See the Bath Society's Papers, vol. iv. Art. 10.

Vinegar, Pickles, acid Fruits, *&c.*—Theſe act powerfully upon lead and its preparation, and, it is to be feared, often acquire an unſuſpected impregnation of that metal in various culinary proceſſes. Thus when vinegar is diſtilled in a pewter alembick, or paſſes through the worm of a common ſtill, it carries with it a portion of the metal. The proceſs ought therefore always to be performed in ſtone or glaſs veſſels.—It is a very common, but dangerous miſtake, to ſuppoſe that vinegar may be truſted to glazed earthen-ware with perfect ſafety, ſince vegetable acids act more forcibly on the calces of lead than on the metal itſelf; hence the ſevere colicks often brought on in time of harveſt among the poor labourers, from drinking cyder after ſtanding but a few hours in glazed pitchers.†

Yet glazed earthen-ware, in a variety of forms, conſtitutes the veſſels in which pickles are kept; in which acid fruits are preſerved; and in which various kinds of tarts are baked. It is moreover curious to obſerve, that a marked preference is given to them by moſt frugal houſewives, who find by experience that ſuch veſſels occaſion a material ſaving in the article of ſugar:—but they remain to be told, that the increaſed ſweetneſs proceeds from the acid of the fruit being blunted by its union with the glazing of the veſſel, which has a more pernicious tendency than they ſeem to be aware of. For certainly theſe good ladies would not deſignedly ſweeten our viands with ſugar of lead!

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† London Medical Inquiries, vol. v. p. 404.

Here it ought to be remarked, that there is a material difference in the mode of glazing veſſels. The glazing of *ſtone* ware and china being a vitrification of the clay, is indiſſoluble in acids, and therefore ſuch veſſels are perfectly ſafe; while the glazing of ordinary *earthen*-ware, conſiſting of a calx of lead, is eaſily acted upon by acids, and yields a noxious quality.

The ſame remark is in ſome meaſure applicable to veſſels lined with tin. Pure block-tin, it is true, gives no impregnation to vinegar or acid juices, but the generality of tinned veſſels contain a conſiderable alloy of lead, beſides what is uſed in the ſolder. This is very diſtinguiſhable even by rubbing a finger over them, which will ſoon acquire a blackiſh hue from the lead; a circumſtance worthy notice, as too much confidence is generally placed on the ſafety of tinned veſſels. Not to mention the danger of the tin lining ſoon wearing off, and leaving a copper ſurface expoſed. Hence the fatal accidents that have enſued from acid ſauces and gravy ſoups ſtanding too long in ſuch veſſels, and acquiring thereby an impregnation doubly dangerous. For here the poiſon of lead, and verdegris, combine their united forces to undermine the human frame!

The Dutch have been accuſed of correcting the rancidity of oils, and even butter, by pouring melted lead into them. If this be true, the ordinary practice of preſerving ſalted-butter or hogs-lard in glazed earthen veſſels for kitchen uſe, may indeed diminiſh their tendency to rancidity, but not without communicating a more dangerous quality.

But what ſhall we ſay to the ſtill more hazardous practice of chemiſts and apothecaries, who, till very lately, have been ſanctioned by no leſs authority than that of the College Diſpenſatory to boil their oxymels, compoſed chiefly of honey and vinegar, in *glazed* earthen veſſels, for ſuch the words "*vaſe fictili vitreato*" plainly import! And it is much to be feared the direction will continue to be literally obeyed by thoſe who are ſtill ignorant of its dangerous tendency. Such an overſight cannot be ſuppoſed long to have eſcaped the notice of that learned body; but is it not ſtrange they ſhould ſuffer this, and ſome other obvious blemiſhes, to diſgrace one of the moſt elegant Diſpenſatories in Europe, from the year 1746 till the new edition of 1788, wherein I am glad to find them expunged, and that glaſs veſſels only are expreſsly ordered for ſuch purpoſes in future? The old pewter funnels and meaſures, however, ſtill continue to be found in almoſt every ſhop. Into theſe are poured, without heſitation, vinegar and other acids; and the veſſels ſometimes, through hurry, are ſet by unwaſhed. On expoſure to the air for ſome time, a fine efflореſcence of ſugar of lead is formed on the inner ſurface, ready to ſweeten the next draught or julep that happens to be poured into them!

TEA is imported into this country in cheſts lined with ſheet lead.—This, like other vegetables, contains a weak acid, which quality is probably heightened by a latent fermentation which tea undergoes when damaged by moiſture. May it not in this ſtate act on the metal? How far the tremors, depreſſion of ſpirits, and other nervous ſymptoms generally aſcribed to this vegetable, or the hot water in which it is infuſed, may not, in ſuch

inſtances

inſtances, with equal probability be attributed to the lead in which it is incloſed, is left for future obſervation.

Saturnine Medicines.—Lead, though a poiſon, yet in ſkilful hands is capable of being rendered an uſeful medicine, and therefore is ſtill properly allowed to retain a place in the Diſpenſatory. As a cooling ſedative, it ſuddenly allays pain and inflammation; as a ſtrong ſtyptick, it powerfully checks the bleeding of ruptured veſſels, and other profuſe evacuations. Its moſt active preparation is ſugar of lead; but every preparation of this metal undoubtedly demands the utmoſt circumſpection, and particularly when it is adminiſtered internally. By combining it with opium, to counteract its deleterious effect on the bowels, I have ſometimes ventured to give it in certain deſperate caſes, and that with very evident advantage.* As lead enters the compoſition of a variety of applications deſigned for external uſe, as lotions, eye-waters, ointments, plaiſters, &c. the untoward ſymptoms which ſometimes ſucceed, are totally unlooked for, and therefore generally referred to every cauſe but the right one. Among the popular applications of this claſs, *Goulard's* famous Extract of Saturn, and his vegeto-mineral water, ſeem to ſtand at the head of the liſt; and though perhaps inferior to an aqueous ſolution of the ſugar of lead, are nevertheleſs far more faſhionable remedies. Applications of this nature may, it is true, be uſed with tolerable ſafety where there is a whole ſkin, and its texture ſufficiently entire to prevent abſorption. But where it is ſoft and ſpungy, or the ſcarf ſkin ſtripped off, or ulcerated, the poiſon of courſe will be more liable to be abſorbed into the ſyſtem, and to produce its pernicious effects. Inſtances of this have been remarked by my friend *Dr. Percival*, and other accurate obſervers. To prevent the tender ſkin of infants from being excoriated, nurſes ſeldom fail to ſprinkle the parts plentifully with white lead. Hence perhaps the ſevere gripes and fatal convulſions which ſo often enſue, though generally attributed to other cauſes.

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* Even thus guarded, the doſe ought to be cautiouſly increaſed, and perhaps never exceed three or four grains a day. What are we to think then of certain Engliſh Diſpenſatories and Compendiums of Phyſick, (the daily companions of all our young practitioners) who gravely recommend it to be given from ſeven to nine, nay even to twelve grains and upwards a day! See Quincy's Diſpenſatory--Shaw's Practice of Phyſick—Ball's Practice of Phyſick—Naval and Military Diſpenſatory—in which laſt twenty grains are ordered for a ſingle doſe!!

CHILDREN'S PLAY-THINGS are commonly painted with a compoſition of red or white lead; but how often do we ſee the ſmiling innocents ſuck within their lips thoſe pernicious toys, while the unſuſpecting parents look on with apparent ſatisfaction? The application of an ointment with litharge, or white lead, to nurſes ſore nipples, often proves fatal to ſucking infants: twelve inſtances of this ſort are recorded by *Sir George Baker* to have happened at Dartmouth.—Our common red wafers receive their colour from red lead. When theſe are accidently picked up by tame birds, they ſoon prove fatal, which ought to be a caution to thoſe inconſiderate perſons who are fond of not only chewing, but ſwallowing them.

PAINTERS IN WATER-COLOURS are equally reprehenſible for incautiouſly moiſtening their pencil with their lips, and frequently holding it in their mouths a conſiderable time. Thus the ſaliva, repeatedly imbued with a ſlow poiſon, is inſenſibly ſwallowed from day to day, till at length the health becomes viſibly impaired without the cauſe being ſuſpected, unleſs the colick or palſy ſhould ſupervene.*

COSMETICKS.—Were it permitted us to penetrate the ſecret receſſes of the toilet, and to explore at leiſure the nature of the myſterious articles which adminiſter ſo conſpicuouſly to artificial beauty, we ſhould probably find that ſome of the moſt celebrated coſmeticks conſiſt of preparations of lead, mercury, or biſmuth.

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* A diſcovery we owe to the ſagacity of my late excellent friend Dr. J. Fothergill.—See London Medical Inquiries, vol. v, obſ. 37.

Carmine, or harmleſs rouge, (as the ladies are pleaſed to term it) is a preparation of cochineal in nitrous acid, with ſome other ingredient which is kept a profound ſecret. This favourite compoſition, which gives the roſeate bloom to their countenance, being prepared with a ſtrong mineral acid, is perhaps not altogether ſo very innocent as they imagine: beſides, its exceſſive dearneſs renders it an object of adulteration; and vermilion (a preparation of mercury) though an humble imitation, affords a cheap and inviting ingredient to mix with it. To this, in its ſimple or combined ſtate, they are generally beholden for their roſes, while a calx of lead, or, what is equally pernicious, the magiſtery of biſmuth, gives the laſt poliſh to the lily-whiteneſs which ſo dazzles our eyes.* It is thus our modern Hebes attempt to preſerve a perpetual bloom, and to hold wrinkles and old age at defiance. But alas! alas! theſe pernicious ingredients, although only uſed externally, are liable to be imbibed at every pore, and thence convey a ſlow poiſon into the ſyſtem, highly injurious to health; and, what may appear ſtill more formidable,—deſtructive to beauty! For diſmal to relate! the cold cream, the *pommad divin*, or whatever ſpecious titles ſuch compoſitions may aſſume, at laſt betray their truſt; and, inſtead of beauty, produce real deformity! The artificial roſes ſoon fade, the angelick whiteneſs contracts a dingy brown, when the maſk falls off, and the ſpectre ſtands confeſſed!* Strange that Britiſh ladies, to whom nature has been ſo bountiful, ſhould diſtruſt their native charms, and have recourſe to ſuch wretched ſubſtitutes of art! Is it not truly mortifying that they ſhould thus ſtoop to adorn, or rather diſguiſe their perſons, at the expence of their health!

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* This poiſonous compoſition is generally dignified by the pompous title of pearl powder, and ſold as perfectly innocent. It has however proved fatal to ſome, and ruined the health of many others, without being even ſuſpected. I am credibly informed, that thoſe ladies who are in the habit of enamelling their faces, necks, and boſoms, with this white paint, generally fall early victims to their own indiſcretion; but particularly ſo if they happen to undergo the ſmall-pox, even by inoculation.

But to quit ſo humiliating a ſubject—If what has been offered be not ſufficient to put them on their

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inoculation. Nor is this to be wondered at; the puſtules being unable to penetrate outwardly through the enamelled ſkin, the virus recedes inwardly, and preys on the vital organs.

[*] Particularly on expoſure to the ſun, a hot fire, or ſulphureous vapours.

guard, more would be ineffectual. However, before I conclude, there is one ſimple coſmetick I can venture with confidence to recommend to the ladies, as a perfectly ſafe, cheap, and efficacious ſubſtitute for all the pernicious tribe above-mentioned, and which may be freely uſed without any riſk of detection,—a coſmetick which boaſts the higheſt antiquity, and is perhaps the only true one acknowledged by Nature. It is not only innocent, but highly conducive to health. It clears the complexion far beyond the milk of roſes; and when accompanied with regular hours and briſk exerciſe in the open air, diffuſes over the countenance a more animated bloom than the fineſt rouge.—It is now needleſs to add, that this grand ſecret is no other than cold Spring Water!

Method of detecting Lead by a Chemical Teſt.

To point out a certain method of detecting the poiſon of lead, in whatever form it may be found lurking, next demands our conſideration. This happily is practicable; but the principle on which it depends cannot be clearly underſtood but by thoſe who are tolerably verſed in chemiſtry. The fact, however, is highly intereſting to the publick, and therefore ought to be univerſally known. In whatever ſubſtance, then, this inſidious enemy may lie in ambuſh, whether in wine, cyder, foods, medicines, or coſmeticks, the following teſt, like the touch of *Ithuriel's* ſpear, inſtantly brings the culprit to light.

Take of yellow orpiment in powder......1 ounce,
—— of quick-lime freſh from the kiln...2 ounces,
—— of diſtilled water boiling hot......20 ounces.

Let the whole ſtand twenty-four hours in a cloſe veſſel of glaſs or porcelain, ſtirring the mixture with a wooden ſpatula. Then carefully decant the clear liquor, and ſtrain it into a bottle, which muſt be well ſecured and kept for uſe. Frequent expoſure to air, deſtroys its tranſparency.

REMARKS.

1ſt. If a few drops of this liquor be put into a glaſs of wine or other ſuſpected liquor, and no change of colour, or viſible alteration enſue, be aſſured ſuch liquor is free from lead, or metallick adulteration.

2dly. If the liquor contain the ſlighteſt impregnation of lead, as litharge, or ſugar of lead, (the ſubſtances generally employed for the purpoſes of adulteration) on adding the teſt a precipitation will enſue of a *duſky brown ſediment.*

3dly. If the ſuſpected liquor be high coloured, it muſt be previouſly diluted with triple its quantity of diſtilled water, or the change will not be ſufficiently perceptible: and care muſt be taken to add deliberately from three to ſix drops *only*, attentively marking the alteration. A larger quantity may re-diſſolve the precipitate, and ſoon render it inviſible.

4thly. As iron and other metals may produce a change of colour and precipitation, if any doubt ſhould ariſe concerning the nature of the precipitate, let a quart of the ſuſpected liquor be evaporated in a large crucible to an extract, and afterwards calcined in a red heat. When it is cold the metallick particles may be diſcovered in their proper form in the aſhes.—Or the precipitate may be examined without a tedious evaporation, if it be placed on charcoal, and the flame of a candle be directed upon it with a blow-pipe, by which it may ſoon be reduced to its metallick ſtate.

5thly. If to any medicine, perfume, or coſmetick in form of powder, liquid, or ointment, a few drops of this liquor be added, a brown colour will ſoon appear, if any impregnation of lead be preſent in the compoſition.

6thly. The vitriolick acid and ſaccharine acid may alſo be employed to precipitate lead from liquors, but the above teſt appears to me preferable to any thing of the kind yet diſcovered.

Preſervative Method.

Smelters, plumbers, painters, and manufacturers of red and white lead, in carrying on their dangerous operations, often perceive a ſweetiſh taſte, attended with a ſlight nauſea, or ſenſe of faintneſs, evidently proceeding from the ſugar of lead. But this approach to diſeaſe is too commonly neglected till health is completely ruined. Such perſons ſhould, previous to their going to work early in the morning, inſtead of drinking a pernicious dram, take a ſpoonful of caſtor oil, or oil of olives, and uſe fat oleaginous foods. For their further protection they ought to avail themſelves of a free ventilation to carry off the noxious vapours, and alſo to breathe through mufflers compoſed of double cloth or flannel well dipped in an alkaline ley, and alſo be careful to throw off their dirty clothes the moment their work is over. By theſe precautions they probably might be in a great meaſure preſerved from the poiſonous fumes that daily ſurround them. —The like method of prevention is no leſs applicable to thoſe who are occupied in other pernicious minerals, as grinders of verdegris, gilders in water-colours, workers in quickſilver, &c.

Method of Cure.

The treatment of the various ſtubborn diſorders reſulting from the poiſon of lead belongs not to the common people, but demands the early aid and attention of a judicious and experienced phyſician, who perfectly underſtands the chemical and medical properties of this mineral. Such a practitioner, however, is not always at hand; therefore to prevent improper management, or loſs of time, I ſhall briefly ſketch out the principal outlines of cure, which is all that can be attempted in the preſent eſſay. At firſt the poiſon generally exerts its virulence on the inteſtines under the form of colick, attended with ſevere pain, obſtinate coſtiveneſs, and frequent reachings, which may be called the firſt ſtage. Theſe ſymptoms are generally ſucceeded by a paralytick affection of the extremities, accompanied with numbneſs, loſs of motion, and frequent pains through the limb affected. This may be conſidered as the ſecond ſtage.

In the firſt ſtage, the chief intention is to reſtore a free paſſage through the bowels. But this is not to be attempted by ſtrong emeticks, or rough purgatives,

gatives, which, inſtead of anſwering the intention, ſerve but to exaſperate the ſymptoms. The pain muſt firſt be allayed, and the ſpaſm relaxed by a liberal uſe of opium and the warm bath, before purgatives can be retained, or adminiſtered with any proſpect of ſucceſs. A truce being thus obtained, evacuants will then have their deſired effect. And if mild lenient cathartickѕ, ſuch as caſtor oil, calcined magneſia, Epſom ſalt, or phoſphorated ſoda, ſhould anſwer, it will be unneceſſary to have recourſe to the more draſtick ſtimulating kind. Their operation will be greatly aſſiſted by copious dilution with warm mutton broth, or new milk whey. As ſoon as the bowels are throughly emptied by this preparative courſe, they muſt be kept in a ſoluble ſtate by ſuch remedies as are gently laxative, and at the ſame time have a direct tendency to decompoſe the poiſon. Such a remedy is liver of ſulphur, which poſſeſſes both theſe qualities in an eminent degree, and therefore promiſes to become one of the moſt powerful antidotes againſt this, and perhaps other metallick poiſons. It is, however, too nauſeous and unpalatable to be taken for any length of time in its natural ſtate of hepar, though either of the ingredients may be taken ſeparately without the leaſt diſguſt. Therefore ſimple flowers of ſulphur may be taken in any agreeable form, and if waſhed down with lime-water, or a weak alkaline lixivium, the reſult will be a hepar, and the effect the ſame.

When that remarkable tranſition of the diſeaſe from the bowels to the extremities, which ſo diſtinctly marks out the ſecond ſtage, commences, the colick is immediately transformed into a palſy.

The indication now is to ſubdue the reliques of the poiſon which infeſt the nerves of motion, and alſo to reſtore the energy of thoſe muſcles whoſe action is impaired. Nothing bids ſo fair to anſwer this intention as warm mineral waters of the ſulphureous and chalybeate kind, eſpecially when they are uſed both internally and externally. Hence the ſurprizing efficacy of the BATH WATERS, which have long been found ſuper-eminently uſeful in this ſtage of the diſeaſe.

To thoſe ſalubrious ſprings, as the *dernier reſource*, invalids of this claſs continually repair from various parts of the globe, and particularly from the cyder counties.

Here, after the diſeaſe has baffled a variety of medicines, they often find a complete cure, and return home with joy and gratitude, leaving behind them their crutches as *votive tablets* in teſtimony of the ſuperior efficacy of the waters.

Here the liver of ſulphur, in the ſubtilized form of hepatick air, together with a portion of iron in a highly attenuated ſtate, are by nature admirably combined with the aqueous fluid, conſtituting a medicated compound, at once pleaſing to the palate, congenial to the conſtitution, and hitherto inimitable by art.

E S S A Y III.

On the POISON of COPPER.

Unde fames homini vetitorûm tanta ciborûm?
Audetis veſci, genus ô mortale! quod oro,
Ne facite; & monitis animos advertite noſtris!

OVID. METAM. XV. 138.

Properties of this Metal, and its extenſive Union with other Bodies.

COPPER, in conſequence of its ductility and ſplendor, is well adapted to various purpoſes in metallurgy; but it is no leſs remarkable for its ſolubility. It is liable to be acted upon by almoſt all ſaline and metallick ſubſtances, and probably for this reaſon the ancient chemiſts have given it the whimſical name of *Venus*, conſidering it as a common proſtitute to all other bodies. It readily diſſolves not only in every acid, but alſo in alkalies both fixed and volatile, in neutral ſaline liquors, and even in vegetable oils and animal fats, in conſequence of the latent acid which they contain.

Copper when rubbed with a warm hand yields an unpleaſant odour, and, when applied to the tongue, a nauſeous taſte. Expoſed to a moiſt air, it contracts a greeniſh ruſt; even pure water ſuffered to ſtand long in copper veſſels, contracts a coppery taſte, and unwholeſome quality.

It is very remarkable, that water becomes more ſtrongly impregnated with the metal on ſtanding in the cold, than if boiled in the veſſel for a much longer ſpace. The ſame is ſaid to take place in regard to vegetable acids. Hence the confectioners venture to prepare the acid ſyrups even of orange and lemon juice in copper veſſels. Theſe acid preparations, according to *Dr. Lewis*, acquire no ill taſte from the metal while kept in a boiling heat, whereas, if kept cold in ſuch veſſels, they ſoon become impregnated with the diſagreeable taſte, and pernicious qualities of the copper. But the mere taſte is by no means a ſatisfactory teſt, becauſe a very ſlight impregnation of copper may be ſo far diſguiſed by the acid and ſugar as to elude the taſte, and yet prove injurious to the nervous ſyſtem. Mineral acids are acknowledged to act more powerfully on this metal when aided by heat; and admitting that the action of vegetable acids is on the contrary weakened by heat, yet we have no proof that it is thereby wholly deſtroyed.

Preparations

Preparations of Copper uſed in Medicine.

This metal with the vitriolick acid yields vitriolate copper, or blue vitriol;—with the vegetable acid, verdigris;—with volatile alkali, tincture of copper;—with ſal ammoniack, ammoniacal copper. Theſe are the principal preparations of copper that are now in uſe for medicinal purpoſes: they act as powerful tonicks, ſedatives, and aſtringents, and become uſeful remedies, or virulent poiſons, according as they are managed. Externally they are employed as eſcharoticks for deterging foul ulcers, and diſpoſing them to heal. Internally they are ſometimes given in hyſterick, epileptick, intermittent, and other nervous diſeaſes, but ought never to be adminiſtered without the utmoſt caution. Verdigris being the moſt intractable of the whole claſs, has long been confined to external uſe, except for the purpoſe of expelling arſenick and other fatal poiſons. It is generally rejected the moment it comes in contact with the ſtomach, and is perhaps one of the moſt inſtantaneous emeticks in nature; but as it operates with great vehemence, it perhaps ought not to be hazarded even in theſe caſes, eſpecially when the inflammation may be ſuppoſed to have already made a conſiderable progreſs.

In various Arts.

This and other preparations of copper are highly eſteemed in the arts, for the beautiful blues and vivid greens which they communicate to various ſubſtances, and are therefore frequently employed in painting in oil and water-colours, in colouring glaſs, and in enamelling. Even the ores of this metal exhibit a variety of exquiſite colours, blue, red, green, yellow, variegated like the rainbow, or peacock's tail. The lapis lazuli, from which the precious blue pigment termed *ultramarine* is prepared, is no other than an elegant ore of copper. To this, the jaſper and the ſapphire alſo owe their beautiful tinge. Ores of this metal are found in moſt parts of the world; but when they happen to be mixed with iron, the copper cannot be ſeparated to advantage by any method yet diſcovered; hence ſome rich copper-mines, on this account, remain unworked.

Copper is ſometimes, though very rarely, preſent in waters under the form of vitriolated copper in ſolution. Such is the celebrated water of Wicklow in Ireland, which yields a conſiderable quantity of copper, by a very ſimple proceſs. Iron bars are immerſed in the water, and after ſome time are found covered with a rich coat of copper.* This inſtance of chemical attraction has impoſed on ſome perſons ſo far as to be conſidered as an actual tranſmutation of iron into copper, but is in fact a mere precipitation.

In Combination with other Metals.

Copper readily unites with other metallick ſubſtances, and affords various compound metals.

Thus copper with about 1-4th part of zinc forms braſs.
——— with 1-10th of tin—bell-metal
——— with 1-8th of arſenick—white copper.

It is moreover the baſis of bronze, ſpecula, Bath-metal, Princes-metal, and all the yellow compounds prepared in imitation of gold. Even ſilver receives an alloy from copper, before it can acquire a proper degree of hardneſs for plate.

Braſs is leſs diſpoſed to contract ruſt than copper, and bell-metal than braſs; white copper leaſt of all;

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* A ſpring of this kind is alſo lately found near Berkley in Somerſetſhire, which I had an opportunity of examining. The water imparts to poliſhed iron a coppery appearance, has a nauſeous ſtyptick taſte, and is powerfully emetick. The family, finding it unfit for uſe, have had recourſe to a neighbouring ſpring, which, however, probably partakes in ſome degree of the ſame quality. Be this as it may, ſeveral of the family have at different times been attacked with ſevere epileptick fits, as they aſſured me on my viſit to one of the brothers then labouring under that diſeaſe.

but the arſenick in its compoſition alone renders it totally unfit for culinary uſe. If acid liquors are ſuffered to ſtand a few hours in any veſſel containing a mixture of copper, they acquire a bad taſte, and conſequently a ſlight impregnation of the metal. Nor are ſilver veſſels wholly exempt from this inconvenience, eſpecially ſuch as are conſiderably alloyed with copper,

Effects of the Poison *of* Copper.

When this poiſon is accidentally received into the body, unleſs it be immediately expelled, it produces the moſt formidable ſymptoms, as enormous vomitings, profuſe diſcharges of bile both upwards and downwards, inflammations, and eroſions of the ſtomach and bowels, delirium, convulſions, ſyncope, and death. Nay, even the handling of this poiſon in the form of verdigris, or a compoſition containing it, has in certain irritable habits been known to occaſion very diſagreeable effects.* The manufacturers of verdigris, and thoſe who grind it for paint, or uſe it in oil or water-colours, ſeldom fail to experience its noxious influence on the organs of reſpiration, or digeſtion.

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* See the extraordinary caſe of Mr. Butler of Moſcow, as recorded by Dr. Mounſey. Among other ſymptoms, ſevere itching, and burning pungent pain darting through the limbs like electricity.

Phil. Tranſ. vol. 50, art. 2d. and Sequel, vol. 54, art. 2d.

"I have known," ſays an eminent Profeſſor of chemiſtry, "vehement vomitings and convulſions in children from the *Unguentum Ægyptiacum*, (whoſe baſis is verdigris) injudiciouſly applied to ulcers in the mouth;† likewiſe a perſon, who, accidentally having ſwallowed a braſs ſleeve button, was ſeized with violent ſymptoms, and died in miſery, no medicines giving relief."

Abuſe of Copper Veſſels.

It is extremely unpleaſant to reflect on the dangers to which we are ſo often expoſed by the uſe of copper veſſels for preparing various foods. This conſideration has indeed induced ſome diſcreet families to diſcard this dangerous metal from all culinary proceſſes. But though verdigris is one of the moſt violent poiſons in nature, yet the greater part of mankind, rather than abandon an old cuſtom, are content to ſwallow a portion of this poiſon every day! Accordingly veſſels of copper, braſs, or bell-metal, are ſtill permitted to ſupply their reſpective quota of this deleterious ſubſtance to imbue our ſeveral viands. Having, through long uſage, obtained a quiet ſettlement amongſt us, they now claim, as it were, a preſcriptive right to aſſiſt at all culinary operations—a claim which we ſeem neither to have inclination or reſolution to diſpute: for, notwithſtanding every remonſtrance to the contrary, copper and its compounds continue to diſgrace not only our kitchens, dairies, and confectionaries, but alſo the breweries, diſtilleries, laboratories, and even ſhops of the apothecaries. The very air of theſe places abounding with acid, oleaginous, and ſaline particles, penetrates and diſpoſes them to diſſolution, even before they are uſed. The mildeſt fluids, ſuch as milk, whey, or even plain water, left to ſtand in open copper veſſels, receive an impregnation of the metal, diſcoverable by the volatile alkali. But it is remarkable that the corroſion always begins at the ſurface, in contact with the air, and is diſtinguiſhable by leaving a greeniſh ring. Such is the power of the air in promoting the action of the menſtruum. On this principle, perhaps, may be explained why acid vapours act more powerfully on lead and copper than the acids themſelves, converting the former more ſpeedily into ceruſs, the latter into verdigris.

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† Newman's Chemical Works, vol. i, p. 98.

People generally imagine that the ill effects of copper are entirely prevented by its being tinned, and therefore without heſitation commit to ſuch veſſels acid ſoups, vinegar, lemon-juice, apple-ſauce, greens, butter, and other articles equally exceptionable, where they are ſometimes ſuffered to remain a conſiderable time without any ſuſpicion of danger. But the tin which lines the copper is ſo extremely thin that it is ſoon abraded, or even penetrated by the verdigris, which inſinuates itſelf through the pores of the metal, and at length betrays itſelf by a green efflereſcence on the ſurface. Add to this, the tin is generally alloyed with a conſiderable proportion of *lead*, beſides an additional quantity contained in the ſolder.

Examples are indeed too frequent of fatal conſequences from foods that had received a taint from copper veſſels, whether from the food being of an acid nature ſo as to corrode or diſſolve a portion of the metal, or from the veſſel having contracted a ſoluble ruſt or verdigris, by expoſure to the air, or being badly tinned. The affecting incident of this kind, which happened ſome years ago to ſeveral gentlemen at an entertainment at Salt-Hill, is ſtill within our remembrance. Though it was then generally attributed to adulterated wine, it was at length brought to light by the confeſſion of the cook, who acknowledged juſt before her death, that it was wholly owing to the poiſon of copper, in conſequence of her own careleſſneſs, and which, through fear of puniſhment, ſhe had been induced till then to conceal.

On dipping into ſome of our beſt ſyſtems of modern cookery, which have undergone ſeveral editions, I am ſorry to find, amidſt the numerous corrections and improvements, ſo much room ſtill left for amendment, and ſo much ſerious cauſe for animadverſion. Nor is this to be wondered at. The culinary art depends almoſt entirely on chemical principles, and every profeſſed cook may in ſome meaſure be conſidered as a practical chemiſt; and the kitchen, the laboratory wherein are daily performed various chemical proceſſes highly important to health. The principles of chemiſtry therefore ought to be well underſtood by thoſe who practiſe cookery, and particularly by ſuch as undertake to inſtruct others in the art. But where ſhall we find cooks competent to the taſk; or even a ſingle book on the ſubject that does not betray the author's ignorance, not only of the chemical properties of the various ſubſtances, but alſo of the veſſels and apparatus employed? From this cauſe proceed many dangerous miſtakes and inaccuracies. Theſe from time to time are copied by ſucceeding writers, perhaps equally enlightened as their predeceſſors, and are thus tranſmitted through various new impreſſions. Hence we every where meet with error and inconſiſtency, blended with inſtruction; and theſe pervade all their works.

It is curious to remark, that in the introductory part of theſe complete Treatiſes on Modern Cookery, the reader is generally very gravely admoniſhed againſt the uſe of veſſels made of copper, braſs, and other dangerous materials—that vinegar and ſalt penetrate common earthen-ware, and therefore pickles ought to be kept in ſtone or glaſs jars. But when arrived at the receipts for pickling and preſerving acid fruits, what muſt be the gentle reader's aſtoniſhment to find thoſe very veſſels expreſsly recommended which ſo lately were abſolutely condemned! Thus, in the proceſs for pickling gerkins, or young cucumbers, "the beſt white-wine *vinegar*, in which they are to be pickled, is ordered to be boiled in a *bell-metal* pot." In a ſubſequent receipt "cucumbers are directed to be pickled in *pewter* diſhes with *ſalt* interpoſed. Afterwards the vinegar to be poured from them into a copper ſaucepan with a little ſalt." It is added, "they will then be fit to eat in two or three days!"

Lemon pickles are ordered to be done in an *earthen* diſh—golden pippins in a *pewter* diſh, with *vinegar*, &c.——"To pickle ſamphire; put it into a *braſs* ſaucepan, throw in a handful of *ſalt*, and cover it with good *vinegar*, and ſet it over a ſlow fire."

Others, with leſs reſerve, recommend *copper* coin to be put into each veſſel in which theſe pickles are kept, becauſe, ſay they, "it preſerves their colour, and gives them a beautiful green."

From eating a quantity of fine pickled ſamphire thus imbued with copper, an amiable young lady was preſently ſeized with dreadful convulſions, which ſoon put a period to her life. This melancholy caſe has been already communicated to the publick by my ingenious friend *Dr. Percival.**

If our pickles muſt abſolutely look green to pleaſe the eye at the expence of health, or even life, why ſhould our fair authors, who preſide over all culinary operations, and conſequently over our health and lives, thus mince the matter? Why not ſteep the pickles at once in a ſtrong ſolution of verdigris? This ſurely, on certain occaſions, would be a capital improvement, as it would ſpeedily impart to them a more elegant green, together with the entire virtue of the ſalutary ingredient. By thus rendering them "fit to eat" in two or three hours, inſtead of as many days, it would diſpatch the buſineſs with more certainty and greater expedition.

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* See Med. Tranſ. of the Royal College, vol. iii.

After pickles we are preſented with creams; therefore, to crown the banquet, I ſhall ſerve up a very curious one by way of deſert.

Ratafia Cream.

Take ſix large laurel-leaves, boil them in a quart of thick cream, adding eggs, ſugar, &c.

Whether the ſubtile poiſon of the laurel, which this choice receipt exhibits in a very ample doſe, is rendered wholly inert by boiling, and by being inviſcated with the other ingredients, has not been determined. Or whether it may not ſtill, though in a ſlight degree, exert a portion of its ſpecifick power, ſimilar to that of the celebrated laurel water, muſt be left to future experience. It comes in ſuch a very doubtful form, that I can neither incline to try it myſelf, nor ſafely recommend the experiment to others.

The famous clotted cream of Devonſhire being commonly prepared in *braſs* veſſels, bears alſo a very ſuſpicious caſt. It has ſometimes been obſerved to betray a ſlight metallick taſte, and to excite nauſea and vomiting.

If from the kitchen we ſhould dive into the cellar, we ſhall find that acid vapours are predominant, and that the braſs cocks through which our wine, beer, cyder, and vinegar, are drawn, are generally diſcoloured with verdigris.

In theſe ſubterranean abodes, which are often very damp, the green ruſt is often ſuffered to accumulate till it overſpreads the external ſurface of the metallick cock, and would alſo viſibly pervade the internal orifice of the canal, were it not ſucceſſively diſſolved by the liquor, and waſhed off in the general current, as often as the cock is unturned.* That verdigris is ſoluble, in very conſiderable proportion, in all theſe liquors, and therefore capable of impregnating them with the poiſon of copper, is clearly proved by the following experiments:

	Grains
1. Half a pint of rectified Spirit of Wine, digeſted on half an ounce of Verdigris, (240 grains) diſſolved — —	80

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* The braſs and copper cocks, now in uſe, being very unſafe, unleſs kept perfectly clean, which is perhaps impracticable, ought to be wholly diſcarded. Might not a mixture of tin and biſmuth, a compoſition incapable of being affected by vegetable acids, be properly ſubſtituted in their place? or perhaps rather the improved wooden cocks, which would entirely prevent danger, or even ſuſpicion?—The ſilver tops of cruets, in conſequence of the copper contained, are alſo improper, being blackened and corroded on the inner ſurface by vinegar, oil, muſtard, ſugar, &c. Cruets ought therefore to be mounted with ground glaſs ſtoppers.

		Grains
2.	Same quantity of Malt Spirit —	90
3.	——— ——— French Brandy —	150
4.	——— ——— Water —	100
5.	——— ——— common Wine Vinegar	225
6.	——— ——— Diſtilled Vinegar —	230
7.	——— ——— Wine, Beer, and Cyder, diſſolved more than Water or Spirit, but leſs than either of the Vinegars.	

Should we once more reviſit the ſhops, laboratories, and repoſitories of drugs, we ſhould find that in theſe places, it requires no leſs care and attention to guard againſt the poiſon of copper, than that of lead. Here all the powerful ſolvents of copper are aſſembled; acids, alkalies, neutrals, and oleaginous bodies, ſtand in array, as it were, to attack this metal, and to diſſeminate its poiſon. Their very effluvia render all the copper veſſels and utenſils extremely prone to contract ruſt; hence medicines of the moſt innocent kind unexpectedly acquire a noxious quality. Thus in the diſtillation of ſimple waters, in a ſtill of this metal, the laſt runnings, which are evidently acid, have frequently proved emetick. The ſame effect has been obſerved from diſtilled vinegar, which is indeed leſs to be wondered at; nor is it ſurpriſing that oxymels and acid ſyrups, prepared in copper veſſels, ſhould contract a ſimilar quality. Various other aceſcent medicines being often evaporated in braſs pans, or copper veſſels badly tinned, are expoſed to the like impregnation, and therefore extremely liable to ſuſpicion, ſuch as the lenitive electuary, caſſia electuary, rob of elder, and moſt of the vegetable extracts.

Even coral, burnt-hartſhorn, crab's-claws, and other inſipid teſtaceous bodies, however improbable it may appear, are not always exempt from this poiſon; for it has lately been diſcovered by the ingenious Mr. Blizard, that when theſe hard ſubſtances are triturated in a bell-metal mortar, if the powder be cloſely examined it will be found to contain particles of the metal ſeparated by abraſion, viſible to the naked eye, and further diſtinguiſhable by experiments with the volatile alkali.* Bell-metal contains a conſiderable portion of copper, therefore theſe mortars are not only liable to abraſion, but corroſion, by all the ſubſtances that are capable of acting upon copper.

Hence various abſorbent, ſaline, and ſaponaceous bodies, whether reduced into the form of powders or pills in theſe mortars, may eaſily acquire an accidental impregnation of copper.

Braſs mortars and utenſils are equally ſubject to the ſame inconvenience.

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* See Experiments and Obſervations on Copper & Bell-metal, 1786.

Braſs and copper ſcales ſpeedily contract verdigris, from ſalt and groceries being weighed in them, as appears from the green effloreſcence with which we generally ſee them diſcoloured.

Copper Roofs.

Of late the Britiſh copper mines have poured forth the ore in ſuch abundance, that this metal begins to uſurp the place of lead, and to extend its dominion from the cellar and kitchen to the upper ſtories, and even to the roofs of our houſes; ſheet copper being now the faſhionable covering of various new buildings. Notwithſtanding the lightneſs, cheapneſs, and elegance of this new covering, it has certain diſadvantages, which ſeem to have been overlooked.

Being very liable to be corroded by air and watery moiſture when thus expoſed to the weather, the rain-water deſcending from ſuch roofs and gutters cannot be very wholeſome or eligible for internal uſe, ſuch water being found poiſonous to animals; yet where ſprings are ſcarce, the inhabitants are obliged to have recourſe to rain-water for all domeſtick purpoſes. Nor will the painted coating, conſiſting of coal pitch, lately propoſed for obviating this inconvenience, be likely to ſucceed, but rather to increaſe the evil, eſpecially as it contains a manifeſt acid: and were white lead paint to be uſed in its ſtead, the remedy ſtill would be worſe than the diſeaſe.

Copper, moreover, being a powerful conductor of electricity, might not ſuch a wide-extended ſurface of inſulated metal, aided by iron palliſadoes around the parapets, tend to invite the lightning in a ſevere thunder ſtorm, and accumulate it, ſo as to ſhiver the whole building to atoms?

Breweries and Diſtilleries.

The immenſe coppers uſed in theſe and other great publick undertakings, being generally untinned, are peculiarly ſubject to corroſion, and therefore demand uncommon attention to cleanlineſs. In brewhouſes, if any portion of wort (be it ever ſo ſmall) is left to ſtand in the copper when cold, or longer than abſolutely neceſſary, without being well cleaned out, it not only diſpoſes the whole quantity of the ſubſequent liquor ſpeedily to turn ſour, but, what is worſe, impregnates it with the poiſon of copper, incapable of being corrected by the ſucceeding fermentation.

The evil is greatly increaſed by a warm ſeaſon; hence the frequent complaints of ſtale beer, particularly in the ſummer time, among many families.

Such liquor within two or three weeks becomes acid, and unfit for uſe; and if the impregnation of copper is conſiderable, it proves emetick, and highly pernicious to thoſe who drink it as daily beverage. On the other hand, thoſe brewers who pay cloſe attention to their veſſels, and reward their ſervants for doing the ſame, prevent this unwholſome impregnation altogether, and have the additional ſatiſfaction to find that their beer, inſtead of being returned on their hands as unſound, remains ſweet and entire, even in the hotteſt ſummers.

Dairies and Kitchens.

In dairies *milk* and *whey* are heated in large copper or braſs cauldrons untinned; if theſe aceſcent fluids are left to ſtand long, a corroſion of the metal muſt neceſſarily enſue, or if they are ſet by without being carefully cleaned from time to time, they will certainly contract verdigris, being more ſubject to corroſion than lead.

Butter melted in copper ſauce-pans, or thoſe that are badly tinned, is peculiarly liable to acquire the ſame noxious impregnation, as appears from the nauſeous taſte of the metal, and the retchings and ſickneſs which ſometimes ſucceed the uſe of ſuch pernicious ſauce.

Eſculent and aceſcent vegetables, ſuch as ſpinage, cabbage, brocoli, and green peaſe, are generally eſteemed at moſt tables in proportion to the degree of *greenneſs* which they aſſume. To heighten the colour, experienced houſewives, not ignorant of the efficacy of copper, generally give the preference to ſuch veſſels, and to make ſure work of it, on certain occaſions, even direct that copper halfpence alſo ſhould be added! Hence, perhaps, the auſtere metallick taſte and nauſeating quality which we ſometimes, with regret and ſurprize, experience on partaking of theſe dainty inviting vegetables.

Tea.

The water in which tea is infuſed is commonly boiled in a copper kettle, and a remnant is often left to ſtand till the day following, and if the tin lining be worn off,* the water acquires an unpleaſant taſte, which is ſometimes aſcribed to the badneſs of the tea, when in fact, it is wholly owing to the veſſel. After long uſe indeed, the kettle acquires a thick ſtony incruſtation from the earthy particles depoſited by the water, which more effectually guards the copper from corroſion; hence an old tea-kettle *(cæteris paribus)* is much ſafer than a new one. Tea, in its recent ſtate, is ſaid to be dried on hot plates of copper; hence, perhaps, its emetick quality, which however goes off before it arrives in this country. Whether the various nervous ſymptoms generally attributed to that vegetable, may not ſometimes proceed from a metallick impregnation, ſeems at leaſt equivocal.

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* So extremely thin is the tin in general, that even in the better ſort of coating, it has been computed that half an ounce is made to cover 254 ſquare inches, being only one grain of tin to a ſquare inch, and in inferior ſorts, conſiderably leſs.

WATSON's Chemiſtry, vol. iv. p. 181.

The abuſe of copper veſſels is by no means confined to cities, towns, and villages, but extends to camps, fleets, and mercantile ſhips, where fewer accommodations, and leſs attention to cleanlineſs, may be naturally expected. Excluſive of this, copper veſſels at ſea are peculiarly liable to contract verdigris, from the marine acid with which the air is impregnated, to ſay nothing of the additional cauſes derived from the nature of the proviſions, ſuch as fat pork, and other ſalted meats, which are daily boiled in them.——" I have myſelf known (ſays Mr. *Travis*) even a ſmall ſhip's boiler, through neglect of cleaning, become one eighth of an inch thick of verdigris, which would ſometimes ſeparate in large flakes, and mix with the food; when it was no uncommon thing to have the whole crew ſeized with violent vomiting, &c. But the doſe not being repeated long enough, they in general eſcaped the dreadful effects which attend the uſe of coppers in large men of war, where the friction is ſo great, (eſpecially in a rolling ſea) that their coppers, though built as ſtrong as poſſible, are obliged to be new ſet almoſt after every cruiſe."

To this metallick poiſon, chiefly, he endeavours to trace that dreadful ſcourge the *Sea Scurvy*. For, adds he, " the number of ſhips we ſend from Scarborough is about 200 ſail, and the ſeamen about 3000. On board of theſe, *iron* pots are in general uſe, and we have no inſtance of any one having the ſymptoms called *highly ſcorbutic*, except in ſome few of the larger ſhips, in which *coppers* are uſed."*

I ſhall not here ſtop to enquire into the validity of this new theory of the ſcurvy, eſpecially as other cauſes which prevail at ſea are deemed fully adequate to the effect, as the ſaltneſs of proviſions, impure air, together with bodily fatigue and watchings, without having recourſe to this poiſon, which in general, ſhews its effects more ſuddenly by attacking the bowels and nervous ſyſtem.

However this may be, it is certain there have been innumerable inſtances of the pernicious conſequences of eating foods dreſſed in copper veſſels not ſufficiently cleaned from this poiſonous ruſt. Mr. *Ramſay*, and other navy ſurgeons, have obſerved many extraordinary caſes of madneſs ſuddenly appearing among the crew, for which they could aſſign no other cauſe but the foulneſs of the coppers; but upon their remedying that fault, the diſeaſe preſently ſtopped.†

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* London Medical Inquiries, vol. ii. p. 13.

The author of a tract, entitled "Serious Reflections on the Dangers attending the Uſe of Copper Veſſels," publiſhed at London in 1755, aſſerts that "the greater frequency of palſies, apoplexies, madneſs, and all the frightful train of nervous diſeaſes which ſuddenly attack us without our being able to account for the cauſe, or which gradually weaken our faculties, are the poiſonous effects of this pernicious metal taken into the body inſenſibly with our victuals, and thereby intermixed with the animal juices."

From the numerous examples of theſe alarming maladies which have appeared ſince the above period, and *particularly of late*, we may conclude that the cauſe (whatever it may be) ſtill ſubſiſts without the ſmalleſt diminution. If to the effects of this poiſon we add thoſe of lead, and trace back their reſpective influence in cookery, pharmacy, and the arts, and reflect how often they may thus gain ſilent admiſſion into our bodies in various foods, as well as medicines, we ſhall advance ſtill nearer to the truth; and perhaps find ſufficient cauſe for the above conjecture. If ſo, we ſhall ſee but too much reaſon to exclaim with the ſons of the Prophets, (2 Kings, iv. 40.)

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† Ibid, p. 150.

"Death is in the Pot."

But even admitting the myſtery to be thus ſolved, and the real cauſe diſcovered, it ſtill reſts with ourſelves to apply the remedy. Moved by conſiderations of this ſort, the Senate of Sweden, about the year 1753, wiſely prohibited copper veſſels, and expreſsly ordained that none but ſuch as were made of iron or tin ſhould be uſed in their fleets and armies—an example highly worthy the imitation of the Britiſh Senate! The Royal College of London have at length done the ſame, by baniſhing copper veſſels from all chemical and pharmaceutical operations at leaſt, wherein their danger was apparent.†

It therefore only remains to be determined whether we mean to follow ſuch bright examples, or to ſuffer this pernicious metal ſome time longer to diſgrace our kitchens, and mingle its ruſt with our victuals; or in other words, whether we ſhould not rather exert our authority, and reſolve at once to extirpate the cauſe of the evil, than thus tamely ſubmit to receive a daily portion of poiſon from our cooks.

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† See the new edition of their Pharmacopœia, in the year 1788.

Methods of detecting this Poiſon.

For the benefit of thoſe perſons who know the value of health, and wiſh to avoid the dangers that muſt daily await them while copper veſſels continue to be employed in all culinary proceſſes, I ſhall now add a few additional remarks on the principal chemical teſts mentioned in the firſt eſſay, by way of illuſtration.

1*ſt*. The moſt exquiſite teſt of the preſence of copper is the *Volatile Alkali*, or *Spirit of Sal Ammoniac*. If ten or twelve drops of this ſpirit be added to any liquor impregnated with copper, it inſtantly exhibits a blue colour, in proportion to the quantity contained. This elegant experiment has been carried to an almoſt inconceivable degree of minuteneſs by the Honourable Mr. *Boyle*, ſo as to afford at once a ſtriking example of the excellence of the teſt, and the extreme diviſibility of this metal.

2*dly*. Another method is by precipitation with iron. Thus if a piece of poliſhed iron be immerſed ſome time in any fluid wherein copper is held in ſolution by the intervention of an acid, the acid having a ſtronger attraction to iron, lets go the copper to unite with it, and the copper is afterwards found adhering to its ſurface in its ſhining coppery form, as has been already mentioned.

3*dly*. By *evaporation* of a large quantity of the liquor, and ſubſequent *calcination* and *reduction*, as propoſed concerning lead.*

Thus may acids, fermented liquors, and various ſuſpected articles of diet, be eaſily put to the teſt.

Where clear pellucid liquors are to be examined, the *volatile alkali* alone is quite ſufficient; but in all turbid or coloured mixtures, it will be ſometimes requiſite to have recourſe to the ſeveral methods ſucceſſively, by which, it is preſumed, the poiſon cannot eaſily eſcape detection.

Indications of Cure.

Practical authors, among whom M. *Tiſſot*, Dr. *Buchan*, and others, who have humanely condeſcended to inſtruct the common people concerning various diſeaſes to which they are incident, ſeem to have been rather deficient concerning the treatment of metallick poiſons. After the uſe of an emetick, they appear to lay the whole ſtreſs on copious dilution with milk, oil, or fat broths, which, though by no means improper, yet are too often found inadequate to the cure.

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* Eſſay II. p. 59.

Milk, and oleaginous fluids, it muſt be obſerved, diſſolve metallick ſalts with difficulty, and therefore are much inferior to tepid water, the common menſtruum of all ſaline bodies, and the beſt diluent for waſhing them ſpeedily out of the body. Oleaginous ſubſtances tend to mitigate the ſymptoms, it is true, partly by evacuating, and partly by inveloping the poiſon, but having no ſpecifick power, entirely fail of ſubduing the remainder, which often lurks in ambuſh amidſt the various folds of the interior coat of the ſtomach or bowels, and there continues to exert its miſchievous effects.

As the conſequences of mineral poiſons are ſo ſudden, and the ſymptoms ſo extremely rapid as frequently not to admit of calling in a phyſician, or even any other medical aid, I ſhall here attempt in ſome ſort, to ſupply the deficiency of thoſe popular and truly reſpectable writers.

Firſt Indication. Whenever this, or any other metallick poiſon has been inadvertently taken, the firſt indication is undoubtedly to expel it as ſpeedily as poſſible by an emetick of very quick yet ſafe operation. For this purpoſe twenty grains of *White Vitriol* may be diſſolved in half a pint of warm water, and drank immediately, followed by very plentiful dilution with ſimple tepid water alone, till the whole of the poiſon is brought up, which may be known by an entire ceſſation of the ſymptoms.

With reſpect to the preſent poiſon, as a ſingle grain of verdigris excites inſtant vomiting, it ſuperſedes the neceſſity of other emeticks, and this propenſity may be increaſed as long as may be convenient, by mere dilution. But where an hour or more has elapſed before the accident is diſcovered, a portion of the poiſon has already entered the bowels, and cannot now be diſcharged by vomiting, but requires peculiar management; which brings me to the ſecond indication.

Second Indication. Which is, to correct the remaining poiſon by proper antidotes, if any ſuch be known, or to diſcharge it downwards as ſpeedily as poſſible. Fortunately this may be generally accompliſhed where the nature of the poiſon is previouſly known, and the remedy adminiſtered before the internal parts are irreparably injured. This applies indeed principally to the poiſons of the metallick claſs, which are much better underſtood than thoſe of the vegetable kind, and of courſe more eaſily decompoſed by chemical agents.

Thus if to a ſolution of verdigris, which is known to conſiſt of copper combined with an acid, we preſent an alkali or abſorbent earth, we know, from the laws of chemical attraction, that the acid prefers either of theſe bodies to copper, and will therefore depoſit the metal in form of an inactive calx, now deſtitute of the virulence it lately poſſeſſed from the acid. Therefore it may be very adviſeable, the moment this poiſon has been taken, to proceed as follows.

In about ſix quarts of tepid water diſſolve half an ounce of any *alkaline* ſalt, as *ſalt of tartar*, *ſalt of wormwood*, or *pearl-aſh;* or if theſe be not at hand, a ſolution of near double the quantity of common *wood aſhes* when ſtrained through linen, may anſwer the end. Let a pint of this weak *alkaline ley* be drank every half hour, with a tea-ſpoonful of *calcined magneſia*, till the ſymptoms diſappear. As a conſiderable part of the liquor will be rejected by vomiting, this copious dilution muſt be reſolutely purſued till nearly the whole is taken, and the poiſon entirely decompoſed, and waſhed out of the body.

A pint of the *alkaline ley* may alſo be adminiſtered clyſterwiſe, eſpecially if the pain ſhould continue; and the magneſia muſt be repeated till it has operated briſkly, ſo as to cleanſe the ſtomach and bowels very effectually. For while the ſmalleſt particle of the poiſon remains unſubdued, the patient is not ſafe.

The *calcined magneſia* here ſeems greatly preferable to moſt other purgatives, particularly thoſe of the acrid kind, which would be alſo highly improper, on account of their heating quality.

1*ſt*. Becauſe *magneſia* being perfectly mild and inſipid, it ſits eaſy on the ſtomach, while the others are conſtantly rejected.

2*dly*. It operates in ſo gentle a way as to diminiſh the inflammatory diſpoſition, which the others tend only to exaſperate.

3*dly*. As an abſorbent earth, it corrects the acrimony of metallick poiſons by decompoſing them, and is perhaps the only cathartick that poſſeſſes this property.

After this treatment, ſhould any relicks of the poiſon remain, which however is not very probable, the *liver of ſulphur*, as recommended in the preceding eſſay, or a courſe of *Bath Waters*, accompanied by a milk and mucilaginous diet, will, it is preſumed, ſeldom fail to compleat the cure.

It may not be improper to obſerve that the above method is not confined to *verdigris* or poiſon of *copper*, but is equally applicable to other mineral poiſons, as thoſe of *lead*, *glaſs of antimony*, *corroſive ſublimate*, *cobalt*, and perhaps *arſenick* itſelf. This laſt, however, is ſo refractory a ſubſtance, and ſo very intractable to almoſt every method of treatment, that (contrary to what is obſervable of other mineral poiſons) it retains a degree of virulence even after it is decompoſed.——Is it not then a matter of ſerious concern, that this moſt formidable poiſon begins to be adminiſtred as a medicine, not only by men of ſcience, but by illiterate dabblers in phyſick! not only as an external empirical application againſt cancers, but as an internal ſpecifick againſt fevers! For of late it is (as we are informed) indiſcriminately given even in common agues, wherein there certainly can be no juſt ground for having recourſe to ſo doubtful—ſo dangerous—ſo deſperate a remedy, eſpecially when the Peruvian bark, and other ſafe, efficacious, and approved febrifuges are conſtantly at hand!

FINIS.

Page. 86 Scurvy

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